

Remarks

Claims 1-91 are pending in the subject application. Applicants acknowledge that claims 13-51 have been withdrawn from further consideration as being drawn to a non-elected invention. By this Amendment, Applicants have amended claim 1 and added new claims 72-91. Support for the amendments can be found throughout the subject specification and in the claims as originally filed (for example, page 16, lines 11-13; page 17, lines 9-19; and pages 62-69). Entry and consideration of the amendments presented herein is respectfully requested. Accordingly, claims 1-91 are currently before the Examiner. Favorable consideration of the pending claims is respectfully requested.

The Examiner has indicated that the title of the invention is not descriptive and that a new title is required that is clearly indicative of the invention to which the claims are directed. Applicants have amended the title of the invention to "Microfluidic Devices and Uses Thereof in Biochemical Processes." Accordingly, reconsideration and withdrawal of this objection is respectfully requested.

Claims 1-6, 10, 11, 54-62, 64, 65, and 69 are rejected under 35 U.S.C. §102(b) as anticipated by Kopp *et al.* (1998). Applicants respectfully traverse. It is respectfully submitted that Kopp *et al.* fail to anticipate the claimed invention in that the reference fails to teach a device that comprises at least one temperature regulated zone that cycles between at least two different and predetermined temperatures; rather, the reference teaches a device that comprises a plurality of temperature regulated zones that are thermostatted to a single predetermined temperature. It is respectfully submitted that the device of Kopp *et al.* comprises a plurality of temperature regulated zones that are thermostatted at a single predetermined temperature and that "cycling" of these zones around this single predetermined temperature does not anticipate a temperature regulated zone which cycles between at least two different and predetermined temperatures (*e.g.*, two different and predetermined set points such as those recited in newly presented claims 80-87). It is also respectfully submitted that the reference fails to teach those limitations provided with respect to temperature sensors provided in the claimed invention (see, for example, claims 89 and 91). Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b), is respectfully requested.

Claims 1-12, 54-66, and 69-71 are rejected under 35 U.S.C. §102(e) as anticipated by Mastrangelo *et al.* (U.S. Patent No. 6,136,212). Applicants respectfully traverse. It is noted that the Office Action asserts the reference teaches two thermally regulated zones that are: 1) the temperature

cycling means, and 2) a region upstream from the pump which is not heated. However, it is respectfully submitted that Mastrangelo *et al.* fail to anticipate the claimed invention in that the reference fails to teach a device that comprises a microfluidic substrate comprising at least one sample pathway for sample flow and at least one temperature regulated zone that cycles between at least two different and predetermined temperatures, said at least one temperature regulated zone being adapted to bring at least a portion of said sample pathway to said at least two temperatures while a sample is continuously and/or unidirectionally flowing along said sample pathway and wherein the sample is cycled between said at least two different and predetermined temperatures while in said at least one temperature regulated zone. It is also respectfully submitted that those sections of the reference relied upon in support of the rejection of record fail to teach a temperature regulated zone that brings a sample to at least two different and predetermined temperatures. Rather, the reference teaches thermocompression suction pumps that create a pressure differential between the two sides of the liquid drop in order to move the drop through the device. There is no teaching that such a pump heats the sample in the temperature regulated zone nor is there any teaching that a sample is heated to two different and predetermined temperatures while in the temperature regulated zone; rather, the reference teaches that the heating elements heat air and use the cooling of the air to create a vacuum that provides for the movement of a sample in the device. Additionally, it is respectfully submitted that the reference fails to teach the limitations presented in claims 12, 66, and 72-91. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. §102(e) is respectfully requested.

Claims 7-9, 63, 67, 68, 70, and 71 are rejected under 35 U.S.C. §103(a) as obvious over Kopp *et al.* (1998) in view of Wilding *et al.* (U.S. Patent No. 5,498,392). The Office Action indicates that the rejection has been maintained from the previous rejection set forth on June 19, 2002 on the basis that Wilding *et al.* teaches continuous flow of a sample as set forth in column 10. Particularly, the rejection argues that the sample is continuously cycled when it is moved between sections 22A and 22B. It is respectfully submitted that such movement does not meet the art recognized meaning of “continuously flowing” which Applicants submit is understood to mean the continuous motion of a sample in a single direction. Indeed, the Webster’s Dictionary defines continuous as “uninterrupted or unbroken” (see highlighted definition provided for the Examiner’s

convenience). Thus, one skilled in the art would have recognized that the sample of the claims flowed in an uninterrupted or unbroken manner through the sample pathway of the claimed device. This is in contrast to the back and forth motion of the sample as taught by Wilding *et al.* which would not be understood to one skilled in the art as a “continuously flowing” sample. In the interest of advancing prosecution, Applicants have also provided additional claims that recite the unidirectional flow of a sample through the claimed device (see, for example, claims 1 and 79-88).

Applicants also respectfully submit that the combination of references fails to establish a *prima facie case* of obviousness for the claimed invention on the basis that the combination fails to teach each and every limitation of the claimed invention. For example, Kopp *et al.* fail to teach a device that comprises at least one temperature regulated zone that cycles between at least two different and predetermined temperatures; rather, the reference teaches a device that comprises a plurality of temperature regulated zones that are thermostatted to a single predetermined temperature. Wilding *et al.* fail to remedy this deficiency and, thus, it is respectfully submitted that a *prima facie* case of obviousness has not been established for the claimed invention. Further, the combination of references fails to teach the limitations recited in claims related to those temperatures through which the temperature regulated zones cycle (see, for example, claims 73-78 and 80). Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

It should be understood that the amendments presented herein have been made solely to expedite prosecution of the subject application to completion and should not be construed as an indication of Applicants' agreement with or acquiescence in the Examiner's position. Applicants expressly reserve the right to pursue the invention(s) disclosed in the subject application, including any subject matter canceled or not pursued during prosecution of the subject application, in a related application.

In view of the foregoing remarks and amendments to the claims, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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Attachments: Marked-Up Version of Amended Claim; Marked-Up Version of Substituted Title of the Invention; Webster's Dictionary page 305.

Marked-Up Version of Amended Claim

Claim 1 (amended):

1. A device comprising:

a microfluidic substrate comprising at least one sample pathway for sample flow; and
said microfluidic substrate further comprising at least one temperature regulated zone
thatwhichiscapableofcyclingcycles between at least two different and predetermined temperatures,
said at least one temperature regulated zone being adapted to bring at least a portion of said sample
pathway to said at least two temperatures while a sample is continuously unidirectionally flowing
along said at least a portion of said sample pathway and wherein a sample is cycled between said at
least two different and predetermined temperatures while in said at least one temperature regulated
zone.

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Marked-Up Version of Substituted Title of the Invention

[INTEGRATION OF BIOCHEMICAL PROTOCOLS IN A CONTINUOUS
FLOW MICROFLUIDIC DEVICE]

MICROFLUIDIC DEVICES AND USES THEREOF IN BIOCHEMICAL PROCESSES

WEBSTER'S II
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University
Dictionary

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ing contained in a reception. **contents**: Subject matter; significance; of a literary or scientific substance. <Lat. *contenere*: to contain. <Lat. *contentus*: < *paratus*. **Contented**: satisfied; adj. **Contented**: to be content with; content. To make content. **Content**: 1. A critical analysis of the content, esp. the determinacy of occurrence, of ideas, feelings, cases, etc. 2. things as they are; adj. **Content**: to contend. 1. An action. An assertion advanced in a debate. 2. Given to contentious contention; adj.

Contented: the state of being contented; adj. **Content**: also, **contentious**: + terminus; boundary; time boundaries; **contentless**: **contentious**: contest; contentious; intensive; **content**: witness; witness; witness between rivals. 2. A coming; separately, and are in test-ed; **testing**: attempt to invalidate; compete; or, struggle; **contestation**. <(kōn'tē-stā-shən) n. 1. A person who contests; a challenger. 2. A composition: <Lat. *comit*: together; spoken state that specifies its meaning. 2. An event; occurs: **SITUATION**. **contentedly**: adj. <Lat. *ekskō*: -ly. 1. The state of being contented. 2. An arrangement; **contentedly**: adj. **contentedly**: sharing a boundary; immediately preceding; **contiguously**: adj. **contiguously**: 1. Self-restraint; moderation in sexual activity. 3. Volume; **contents**: [Lat. (*terre*) *contingere*: to hold together; classes of the earth, usually Australia, Europe, North America. The European continent; **CONTAIN**.] Exercising the noun continent and the same Latin word; they were borrowed. Both words are derived from *contingere*, which 'Continere', which is also Latin word and had the meaning 'strain, hold back, subdue'. The adjective appeared in the meaning 'character, principle, *contingens*': meaning 'the great age of exploring' the great age of exploring came into use for land that denoted any continuous

continuity. **continuity**: 1. An uninterrupted succession; or unbroken; **continuity**: a *script* consulted to avoid from shot to shot in a film. b: A *script* for radio or television program; **continuity**: n. pl. -ies. [Ital. < Lat. *continuus*: **continuity**: keyboard accompaniment for a solo instru-

ment in which numerals indicate the successive chords, the actual notes played being left to the performer. **continuity**: 1. **continuity**: (kōn-tē-nē'ēs) adj. [Lat. *continuus*: **continuity**: 1. Uninterrupted; unbroken. 2. Math. Designating a function of one or more variables in which the variation of its values can be made arbitrarily small in a sufficiently small neighborhood of every point in a given interval. **continuously** adv. **continuity**: n.

continuity: with this; **continuity**: **irregular**: young about; item; edible; gall; circu-

a father; pet; fiber; toe; paw; fore

toe; paw; fore